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Standard Specification for Sound Sources Used for Testing Open Office Components and Systems¹

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1. Scope

1.1 This specification states the requirements for sound sources used for measuring the speech privacy between open offices or for measuring the laboratory performance of acoustical components (see Test Methods E 1111 and E 1130).

1.2 The sound source shall be a loudspeaker located in an enclosure driven with an appropriate test signal.

1.3 This specification describes the sound source and method of qualifying it using a special qualification signal. Test signals required by open office test methods may differ.

2. Referenced Documents

2.1 ASTM Standards:²

C 384 Test Method for Impedance and Absorption of Acoustical Materials by the Impedance Tube Method

C 634 Terminology Relating to Building and Environmental Acoustics

E 1050 Test Method for Impedance and Absorption of Acoustical Materials Using aA Tube, Two Microphones; and aA Digital Frequency Analysis System

E 1111 Test Method for Measuring the Interzone Attenuation of ~~Ceiling Systems~~² Open Office Components

E 1130 Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index

2.2 ANSI Standards:

S1.4 Specification for Sound Level Meters³

S1.6 Preferred Frequencies, Frequency Levels, and Band Numbers for Acoustical Measurements³

~~S1.11 Specification for Octave, Half-Octave and One-Third Octave Band Filter Sets~~³ Specification for Octave Band and Fractional OB Analog and Digital Filters³

S1.43 Specifications for Integrating-Averaging Sound Level Meters³

3. Terminology

3.1 Definitions:

3.1.1 The acoustical terminology used in this specification is consistent with Terminology C 634.

3.2 Descriptions of Terms Specific to This Standard:

3.2.1 directivity measurement—the measurement used to determine directivity as defined in 4.2.

3.2.2 qualification signal—a test signal of broadband noise or bands of white or pink noise as defined in Terminology C 634.

3.2.2

3.2.3 source point—the point at which the loudspeaker axis intersects the front plane of the loudspeaker (see Fig. 1).

3.3 The following terms in this standard have specific meanings that are defined in Terminology C 634:

3.3.1 background noise,

3.3.2 pink noise,

3.3.3 sound pressure level, and

3.3.4 white noise

4. Sound Source Specifications

4.1 Sound Source Description—The sound source shall be a loudspeaker enclosed in a box that has a maximum dimension of

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards*, Vol 04.06, volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

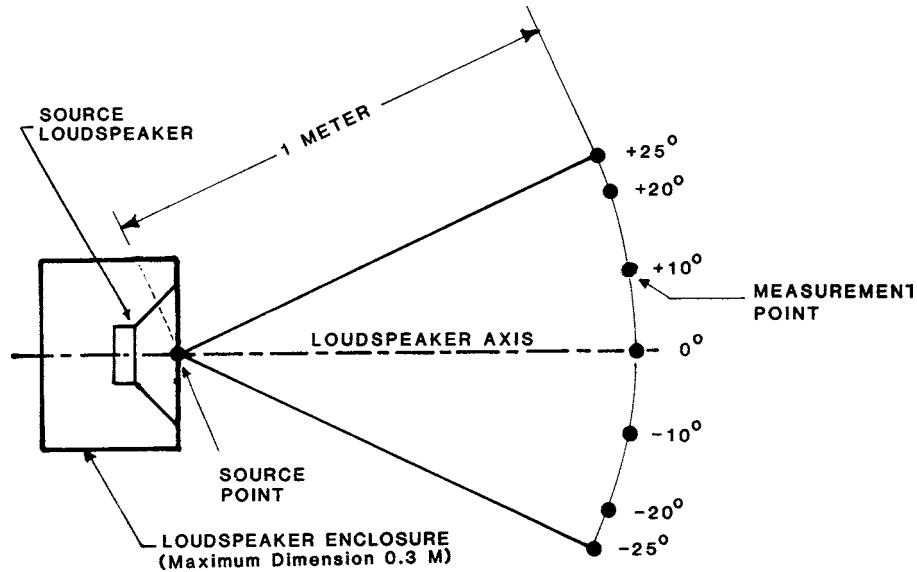


FIG. 1 Measurement Points for Sound Source Directivity

0.30 m (1 ft) on a side, to reduce spurious sound reflections.

4.2 *Directivity*— With the source driven with the qualification signal, the maximum and minimum sound pressure levels within any one-third octave band, from 200 to 3150 Hz measured at a distance of 1.0 m (39 in.) from the source point, at any angle up to and including 25° in any direction from the loudspeaker axis, shall differ by 2 dB or less. At frequencies above 3150 Hz, the difference can be 3dB or less.

NOTE 1—At angles beyond 25° from the loudspeaker axis, the source shall produce lower levels than within the 50° included angle.

NOTE 2—The directivity requirement may be met by using more than one loudspeaker, each one used separately to cover a different portion of the test frequency range.

5. Source Qualification

5.1 *Test Environment*— The measurements shall be carried out in a free sound field. The preferred test environment is an anechoic room with surfaces that have a minimum normal incidence sound absorption coefficient of 0.990 at all frequencies above 175 Hz as measured in accordance with Test Methods C 384 or E1050 or E 1050 or, by the use of other methods, can be shown to be essentially anechoic between 200 Hz and 5000 Hz. Alternatively, an outdoor environment may be used if it is shown that sound reflections do not influence the data.

5.2 Test Instruments:

5.2.1 The measurement microphone, amplifier, and level meter used to measure sound pressure levels shall satisfy the requirements of ANSI S1.4 for Type 1 or better sound level meters except that weighting networks are not required.

5.2.2 A free field microphone shall be used, that is, one that has its flattest frequency response for sounds arriving normal to the diaphragm.

5.2.3 One-third octave filters shall meet the requirements of ANSI S1.11 for Class III, Type R or Type E filters.

5.3 *Qualification Sound Output* —When the sound source is driven with the qualification signal, the sound output shall be adequate to maintain one-third octave-band sound pressure levels at least 10 dB above the corresponding background noise in each band at each measurement location.

NOTE 3—Sources which produce an A-weighted sound level of 70 to 90 dB at 1 m (3.3 ft) when driven with broadband noise usually meet this requirement.

NOTE 4—The background noise consists of the ambient noise and the internal noise of the measuring instruments, as defined in Terminology C 634.

5.4 *Directivity Measurement*—The directivity of the sound source shall be verified by driving the source with the qualification signal and measuring the sound pressure levels at measurement points that include those shown in Fig. 1. For these measurements, the axis of the microphone shall be oriented along the line from the measurement point to the source point with the microphone diaphragm facing the source. This shall be carried out at each one-third octave-band preferred center frequency from 200 to 5000 Hz in accordance with defined in ANSI S1.6. At a minimum, the data shall be obtained at seven measurement points in each of two perpendicular planes, such as the horizontal and vertical planes, at a distance of 1 m (3.3 ft) from the source point.

5.5 It is recommended that the source be qualified in this manner on an annual basis.

5.5 It is recommended that the source be certified per 5.4 prior to first use and after repair or replacement of any component in the speakers that can affect directivity.

6. Qualification Report

6.1 A report shall be made available providing the qualification test data for sources that meet this specification.